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Review of the book Research advances in genetics and genomics

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Book Review



Research Advances in Genetics and Genomics

Implications for Psychiatry

by Nancy C. Andreasen (Editor)

American Psychiatric Association, 2004

Review by Ruth E. Nieuwenhuis-Mark, Ph.D. on Dec 8th 2005

Volume: 9, Number: 49

This short volume, edited by the Editor-in-Chief of the renowned American Journal of Psychiatry, brings together for the first time in book form to my knowledge current strides in the research towards the Holy Grail of human genetics; finding the genetic markers of mental illness. A recent article in Science News highlighted that scientists are making great inroads into finding such markers (e.g. the International HapMap Project, incidentally referred to in *Research Advances in Genetics and Genomics*, while the completed map is published in the Oct. 27 *Nature*, and all data from the project are publicly available online at: <http://www.hapmap.org/>). The Science News article stated that:

"A new map that delineates small genetic differences among people may be a powerful tool for figuring out why some individuals get certain diseases and how to customize their treatments." <http://www.sciencenews.org/articles/20051029/fob5.asp>

It was lucky for me that this article appeared just as I was finishing Andreasen's edited book because the book for the most part is extremely complex and not for the faint-hearted. I fear that many psychiatrists, psychologists and clinicians working with patients who have mental illnesses won't make it past chapter 2. I persisted because I find the whole subject fascinating. I'm glad I did because chapter 3 was both well-written and a revelation (in my opinion it should have been the first chapter after chapter one.)

The Science News article simplified the whole field for me and helped me understand the overall thrust of this book. There are seven chapters in *Research Advances in Genetics and Genomics*, along with a foreword, introduction and an afterword, written by a number of experts in the field. This isn't the book for novices in this field -- I recommend you start somewhere else first. There are valuable insights however. For example, the editor stated in her introduction that the book has been written to:

"commemorate and honor the "double helix discovery" and to prepare psychiatrists for the "genomic era" that will unfold during the 21st century" (p.xiii)

and goes on to say (pxiv):

"It will take time and a great deal of work...to learn...about the movement from molecules to minds-- how our genes contribute to who and what each of us is, and how and why some of us move from the normal continuum into a state of pathology."

It achieves its first aim, in that it lauds Watson and Crick to the extent of reprinting their original paper (an aside -- it was lovely to read this for the first time!), while not convincing me on the second -- preparing psychiatrists for the genomic era. I think that

another book might achieve that, this one for the most part just blinds us with molecular biology and complex terminology.

Chapter 2 was particularly difficult to follow (convoluted, very dry writing), while both chapter 3 and chapter 6 I found well-written as well as fascinating. This book is basically made up of a handful of research papers and as such there is always going to be overlap and lack of cohesion. The introduction and afterword also didn't manage to pull the whole story together for me.

A few key points came through however:

- a.) The need for replication in a number of independent research centers before results should be taken for fact.
- b.) The difficulty of using the classification systems currently available to map on to genotypes or phenotypes -- there is no consensus either in the diagnostic markers for mental illness nor in the methodology the different laboratories use.
- c.) The importance of taking that old bug-bear 'environmental factors' into account when searching for genetic markers. Social relationships, populations (including cultural differences) and effects of medication also need to be taken into account.
- d.) The difference between genetics and genomics as defined by Insel and Collins in chapter 3:

"Genetics is the study of human genes and their effects. Genomics is the more ambitious study of all the genes in the genome, including their function, their interaction, and their role in a variety of disorders that are not due to single genes" (p.28)

- e.) The fact that mental illnesses are on the whole polygenetic -- even relatively straightforward mental illnesses have more than one gene implicated -- autism may have more than 10.
- f.) Even if we do find markers they still don't tell us everything because scientists don't know where in the sequence they are tapping (they could be further down the chain than they realize). It therefore remains difficult to find the 'source' gene.
- g.) When specific genetic markers are found these will have undoubtedly wide-spread implications for psychiatric practice.
- h.) Above all, that this is a complex field.

Investigating the effects of mutations has been a fruitful line of research and animal models can tell us a great deal about how the human brain might function. As Laurence H. Tecott stated in the wonderful chapter entitled: *The Genes and Brains of Mice and Men*:

"genes cannot be systematically manipulated in humans, so we must therefore turn to other organisms to investigate gene function" (p.85) and "approximately 99% of mouse genes have human counterparts." (p.86)

This author also showed the only sense of humor I could spot in the entire book (genetic research is clearly a *serious* subject) when he stated:

"Mice are notoriously noncompliant with questionnaires and interviews" (p.98)

This book would have benefited from much more of this human touch. More emphasis was given to the techniques that are currently being used to unravel the complexities apparent in this field of research.

As is clear from this review, I am not a geneticist but a neuropsychologist who is fully aware that genes will play a large part in unraveling the individual differences we clinicians see in presenting patients on a daily basis. The genome approach puts the emphasis back on the patient to my view, where it belongs, while at the same time ethical considerations must be kept at the forefront and sensitivity to damaged individuals and their carers will only become even more important than it already is. *Research Advances in Genetics and Genomics* somehow manages to lose the person in among the technology and researchers in this field would, in my opinion, do well to remember that these are *human* problems we are ultimately trying to treat. The book didn't address the possibility of making *designer babies* and the whole ethics question.

Many readers will be put off by the complexity and at times convoluted writing in *Research Advances in Genetics and Genomics* and by the fact that it is essentially a bunch of research papers stuck piecemeal together to form a *book*. I fear that it may only really appeal to students and researchers already working in this field, a pity because this *is* the future, whether we like it or not.